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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/795,994	03/10/2004	Kazutaka Shibata	KAW 110D1	2224
7590 06/16/2005			EXAMINER	
Steven M. Rabin Rabin & Berdo, P.C. 1101 14th Street, N.W., Suite 500 Washington, DC 20005			SANDVIK, BENJAMIN P	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/795,994	Applicant(s) SHIBATA, KAZUTAKA	
	Examiner Ben P. Sandvik	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 21-26 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date: ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Dalal et al (U.S. Patent #5796591).

With respect to **claim 21**, Dalal teaches a method for manufacturing a semiconductor device in which substrate (Fig. 5, 10) and a semiconductor chip (Fig. 5, 30) joined to each other with the surfaces thereof on which electrode terminals (Fig. 5, 18 and 48) are formed respectively as facing each other via metals on the surface of said electrode terminal (Fig. 5, 20 and 38), comprising the steps of providing at least one of said metals with a low-melting point metal layer having a lower melting point than that of each of said metals (Fig. 5, 41 and Col 8 Ln 49-50), and melting said low-melting point metal layer or alloying said metals with said low-melting point metal layer to thereby join said substrate and semiconductor chip together (Fig. 6).

With respect to **claim 26**, Dalal teaches alloying said metals provided on the surface of said electrode terminals with said low-melting point metal layer

provided on the surface thereof, and joining to the other of said substrate and semiconductor chip (Fig. 6, 43 and Col 8 Ln 61).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 22, 23, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalal, in view of Davis et al (U.S. Patent #5421507).

With respect to **claims 22, 23, 24, and 25**, Dalal teaches a method for manufacturing a semiconductor device in which substrate (Fig. 5, 10) and a semiconductor chip (Fig. 5, 30) joined to each other with the surfaces thereof on which electrode terminals (Fig. 5, 18 and 48) are formed respectively as facing each other via metals on the surface of said electrode terminal (Fig. 5, 20 and 38), comprising the steps of providing at least one of said metals with a low-melting point metal layer having a lower melting point than that of each of said metals (Fig. 5, 41 and Col 8 Ln 49-50), and furthermore teaches that said metals are made of Au (Col 8 Ln 51-55), but does not teach liquefying said low-melting point metal layer to thereby diffuse said metals provided on the surface of said electrode terminal into the liquefied low-melting point metal, by the liquid-phase diffusion method, thus joining said substrate and said semiconductor chip to each

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other, or that said low-melting point layer is made of an Au-Sn alloy or Sn. Davis teaches a method in which a low-melting point layer is liquefied to thereby diffuse said metals into the liquefied low-melting point metal, by the liquid-phase diffusion method, thus joining said substrate and said semiconductor chip together, and an interface where two Au layers are provided on copper with a layer of Sn provided between the two Au layers (Fig. 5A, 5B, 5C). It would have been obvious to one of ordinary skill in the art at the time the invention was made to join the substrate and semiconductor chip of Dalal using the liquid-phase diffusion method of Davis in order to create a high performance bond, and to select Sn as the low-melting point layer in order to take advantage of its reactive properties with Au.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben P. Sandvik whose telephone number is (571) 272-8446. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

bps



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